Characterization of livestock production systems and the potential of feed-based interventions to improve livestock productivity in Muhoroni sub-County, Kenya

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September 2016

The Feed the Future Kenya Accelerated Value Chain Development (AVCD) program seeks to widely apply technologies and innovations for livestock, dairy and staple crop (root crops and drought-tolerant crops) value chains in order to competitively and sustainably increase productivity, contributing to inclusive agricultural growth, nutrition and food security in 23 counties in the country. Supported by the United States Agency for International Development as part of the US government's Feed the Future initiative, its main goals is to sustainably reduce poverty and hunger in the Feed the Future zones of influence in Kenya.

In partnership with the International Crops for Research Institute for Semi-Arid Arid Tropics (ICRISAT) and the International Potato Center (CIP), International Livestock Research Institute (ILRI) will lead the implementation of AVCD. The three CGIAR centres will work closely with partners—county governments, NGOs, CBOs, private sector actors and other USAID-funded projects/programs, as well as leverage knowledge and best practices from academic institutions and foundations.

This document was made possible with support from the American people delivered through the United States Agency for International Development (USAID) as part of the US Government's Feed the Future Initiative. The contents are the responsibility of the producing organization and do not necessarily reflect the opinion of USAID or the U.S. Government.

Prepared for the United States Agency for International Development, USAID grant number AID-BFS-11-00002-10

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Introduction

Muhoroni sub-County is one of the sub-Counties making up Kisumu County covering an area of 700 km^2 (Table 1). Muhoroni sub-County borders Kericho County to the south, Nandi County to the north, and Nyando and Kisumu central sub-Counties to the west (Figure 1). Kisumu County has the largest number of improved dairy cows, estimated to about 9000 (Table 2).

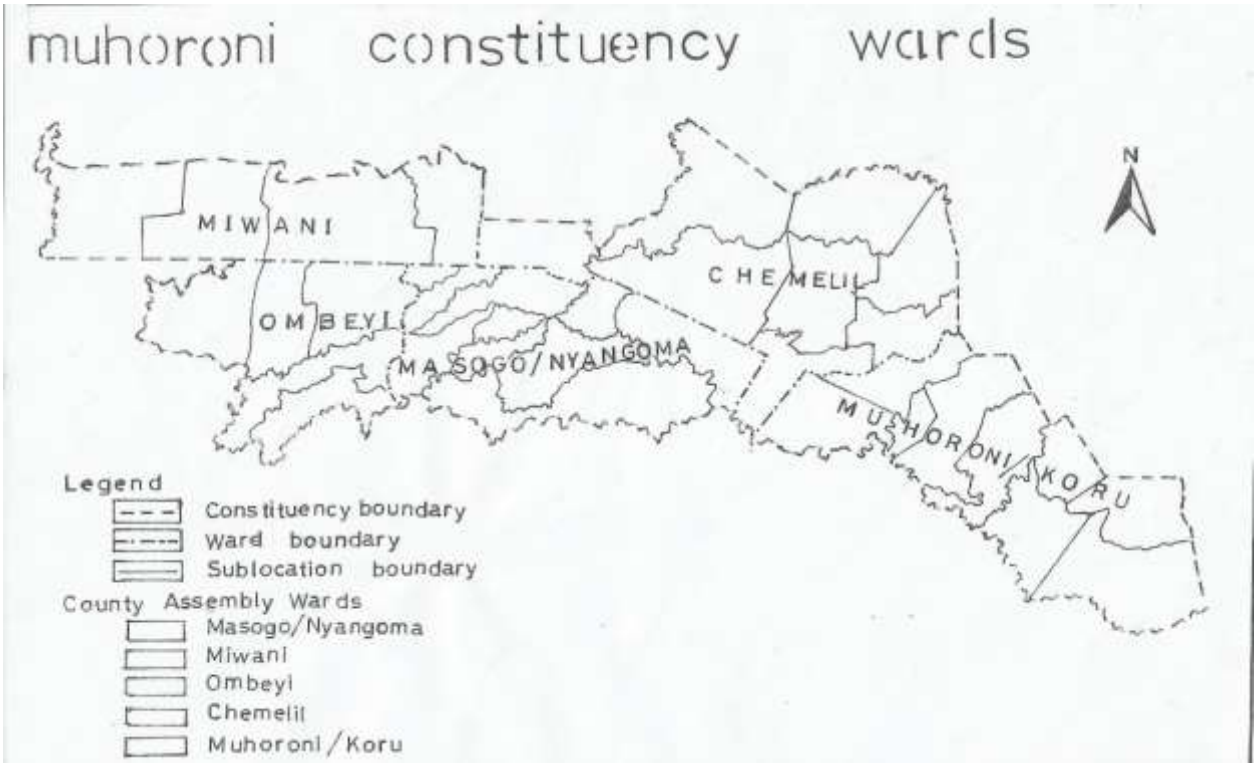

Figure 1: Geographical map of Muhoroni Sub County

Table 1: General statistics of Muhoroni Sub County

Area (km^2)	669.90
Area under water (km^2)	46.90
Total arable land (Ha)	43,600.00
Area cultivated (Ha)	29,730.00
Major rivers	Nyando, Oroba, Mutwala, Tonde
Number of farm families	31,124.00
Area under infrastructure	118.30

Table 2: Livestock population by type

Livestock type	Population
Improved dairy cows	9 000
Local zebu cattle	28 000
Local poultry	180 000
Sheep	6 000
Dairy goats	150
Local goats	5 400
Donkeys	800

Total land area under irrigation in the sub-County is 1290 ha with seven irrigation schemes out of a possible 1603 ha (Table 3). Sugarcane is the most prominent cash crop cultivated in the area under a total area of 6 500 ha while maize is the main food crop cultivated under an area of 4 200 ha (Table 4).

Table 3: Land under irrigation in Muhoroni Sub County

Irrigation scheme	Area (Ha)
Wisawa	140
Rangenya	80
Komugra Aboyi	100
Landi Nyatini	120
Alungo A	100
Alungo B	120
Alungo C	80
TOTAL (Irrigable Area)	**1,603**
Total Area Under Irrigation	1,290

Table 4: Major food and industrial crops grown in Muhoroni sub-County

Major food crops	Area (Ha)
Maize	4200
Beans	980
Sorghum	1200
Rice	2070
Cassava	65
Sweet potatoes	120
TOTAL	**8635**
Major Industrial crops	
Sugarcane	6500
Cotton	50
Coffee	60

Methodology

The objective of the survey was to assess the farming system of the site with an emphasis on livestock feed availability and use with the aim to develop a site-specific strategy for improving feed supply and utilization through technical or organizational interventions.

The survey was conducted in three out of the five wards of Muhoroni (Miwani, Chemelil and Muhoroni/Koru). The three wards are located within a settlement scheme. In all, 16 farmers were selected with a distribution mix of gender, age and farm size of the village. The selected farmers took part in a focus group discussion (FGD) and subsequently 9 (obtained by selecting 3 each from the 3 major landholding categories namely small, medium and large) were selected from those who participated in the FGD to take part in one-on-one interviews.

Data analysis

The quantitative data collected from the focus group discussion and one-on-one interviews were entered into the FEAST excel template (www.ilri.org/feast) and analysed. Results are presented in tables, graphs, pies and bar charts.

Results and discussions

Farmholdings

Farms sizes were categorized into small (0-3 hectares), medium (3-10 hectares) and large (10 hectares and above) landholdings. The majority (60 %) of the respondents belong to the small land size category, while 30 % to the medium-size category, 10% to the large category, and with none under the landless category (Figure 2). The smaller parcels of 0.25 hectares are a result of the customary land tenure system in which land is partitioned between the members of the nuclear family. Sale and leasing of land are common practices in the study area. Land is leased at KSH 12,500 (US $ 125) per hectare.

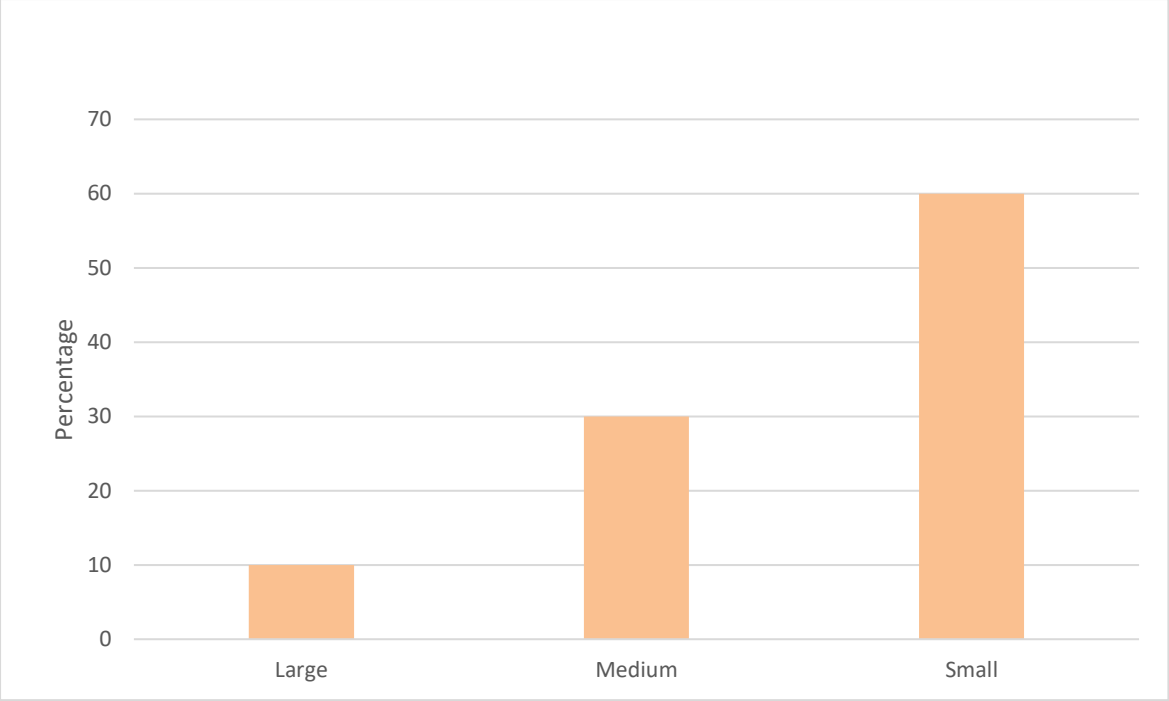

Figure 2: Households by landholding category

Rainfall pattern and corresponding cropping seasons

There are two cropping seasons in the year: 'Chiri' the long rainy season (March – August) and 'Opon' the short rainy season (October – November). The dry season 'Oro' sets in between December to January and a short dry spell in September.

Livestock holdings

The dominant livestock species kept are improved dairy cows, sheep, local dairy cattle, indigenous poultry and donkey.. (Figure 3).

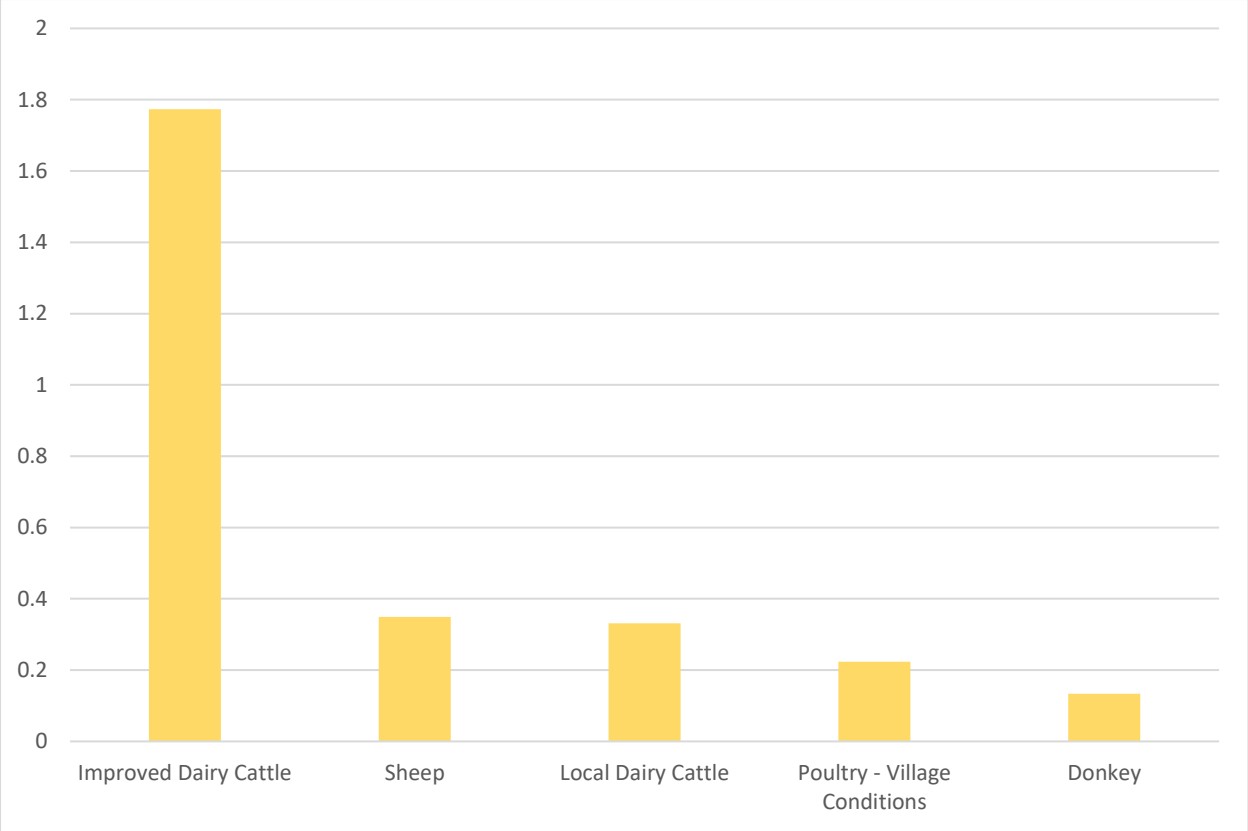

Figure 3: Dominant livestock by average TLU/household

Household income

The business contributes to the highest (34%) of household income followed by crop agriculture (32%) and livestock (29%) (Figure 4).

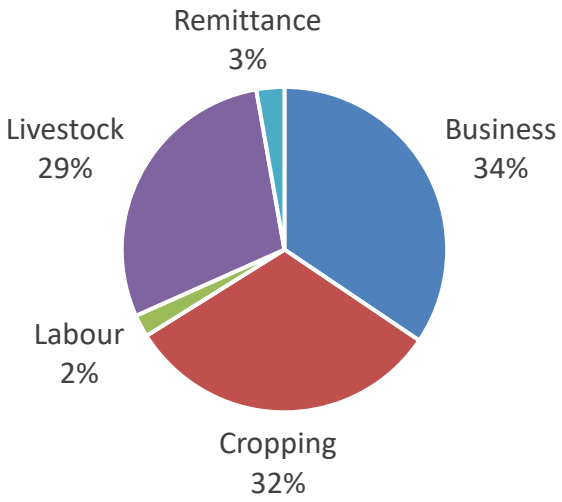

Figure 4: Household income sources by activity

Labour availability

Labour is available throughout the year but the cost is high during peak activity periods such as land preparation, planting, weeding and harvesting. All farm jobs are performed by both gender and no pay disparities exist as a result of gender.

Crop production

The following major crops are cultivated in Muhoroni: maize, sugarcane and beans. Maize is the dominant food crop while sugarcane is the major cash crop in the sub-County. Other crops grown in the area include beans, sorghum and kales (Figure 5). The average land sizes on which the crops are grown varies with maize (0.5 Ha), sugarcane (0.4 Ha) and common beans (0.2 Ha).

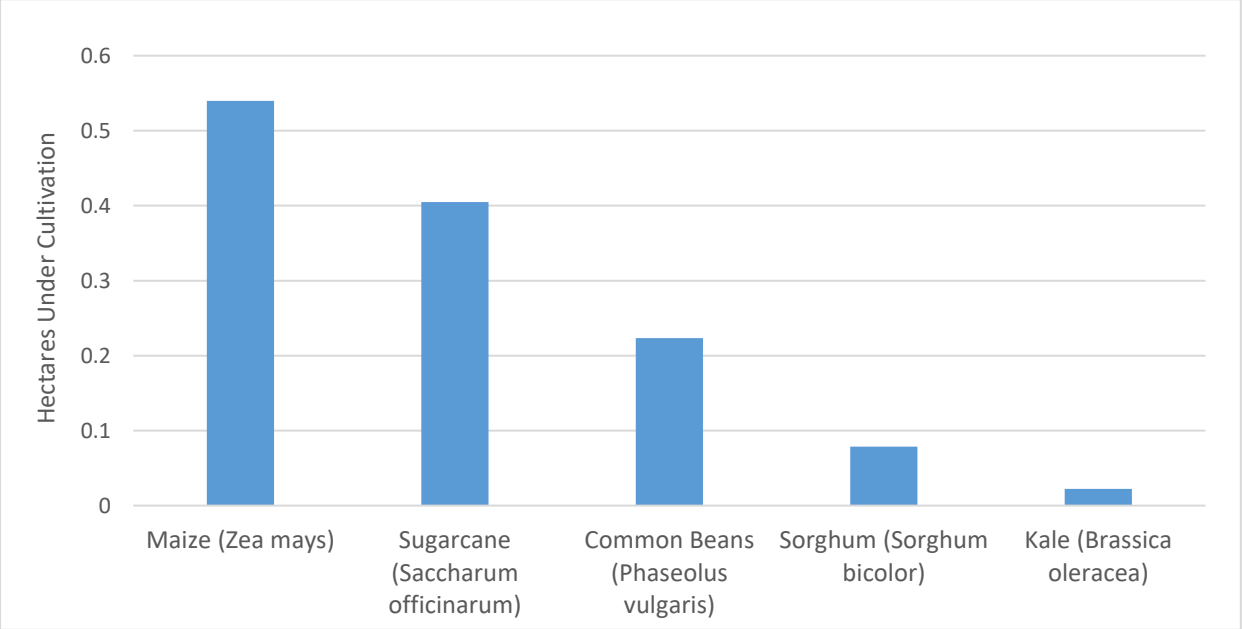

Figure 5: Dominant crops cultivated in the area

Fodder production

The dominant forage crop, Napier grass is planted on averagely 0.09 Ha per household while Sesbania and Calliandra are planted less (Figure 6). Only 2 % of the land has been set aside for forage production and so fodder is collected from the rangelands to feed animals.

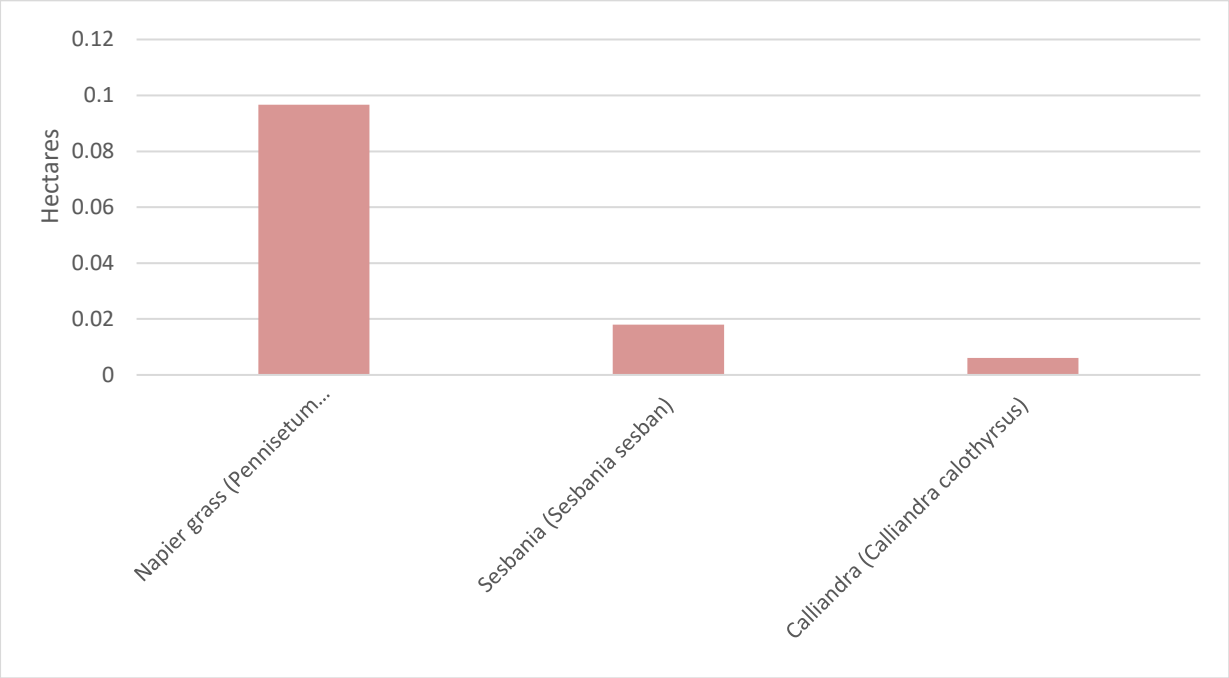

Figure 6: Dominant fodder cultivated by hectares

Livestock feed sources

The feed sources in the area are collected fodder, grazing, cultivated fodder, crop residues and purchased feed. Collected fodder provides the bulk of nutrient intake dry matter (DM) - 74%), metabolisable energy (ME - 72%) and crude protein (CP - 70%). Most of the collected fodder is obtained from sugarcane plots and also from the factory's nuclear estates. Grazing provides between 12-13% of DM, ME and CP intake needs while cultivated feed accounts for less than 10 % for all 3 nutrient categories (Figure 7). The dominant purchased feeds are rice and wheat bran mainly fed to poultry and some dairy animals during lactation (Figure 8). Crop residues mostly in the form of sugarcane tops, maize stovers, sweet potato vines and beans haulms provide less than 5 % of all 3 nutrient components. Farmers expressed that there is enormous pressure on land for food, cash and fodder crop production.

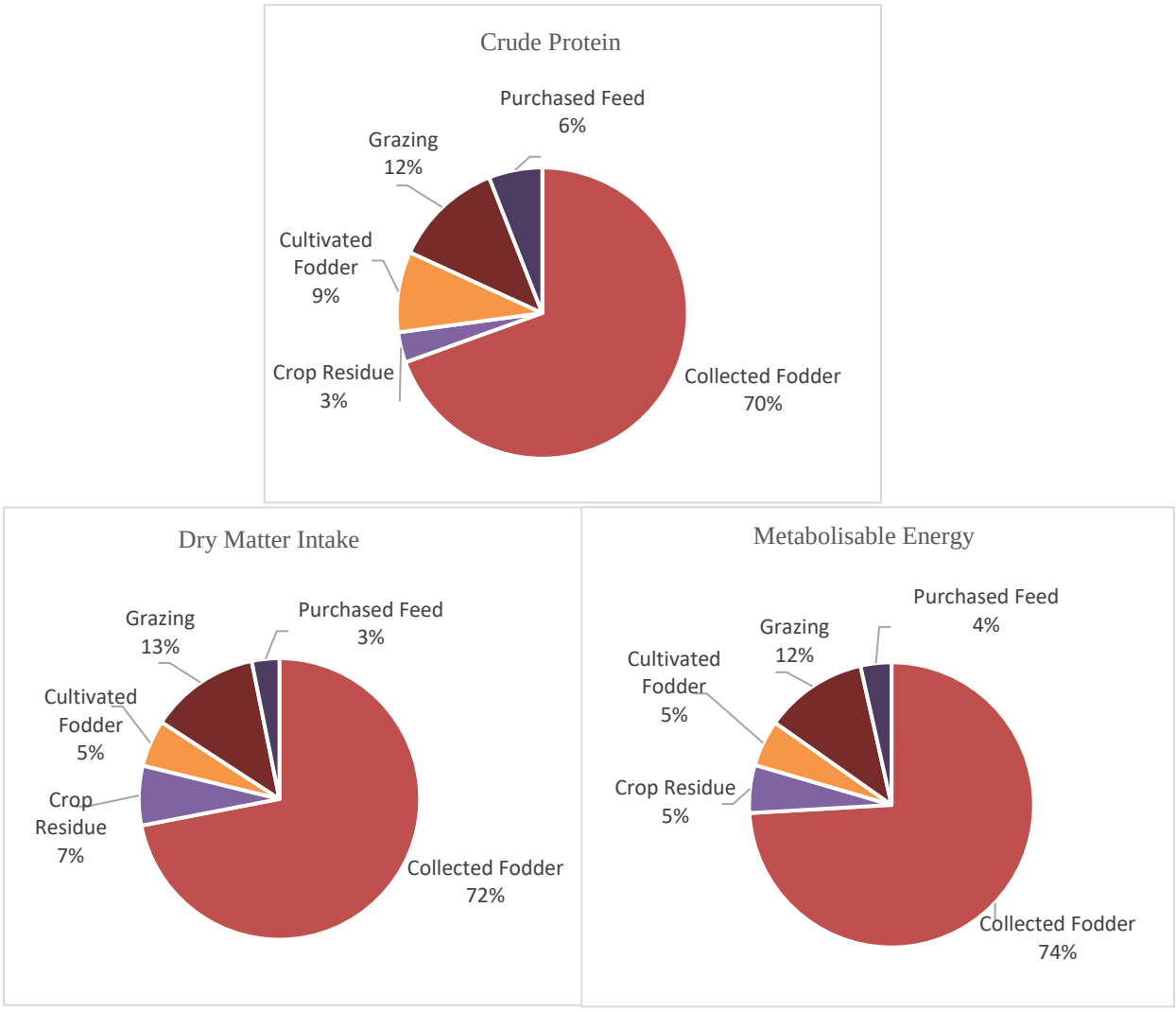

Figure 7: Dry matter, Metabolisable energy and Crude protein intake by source

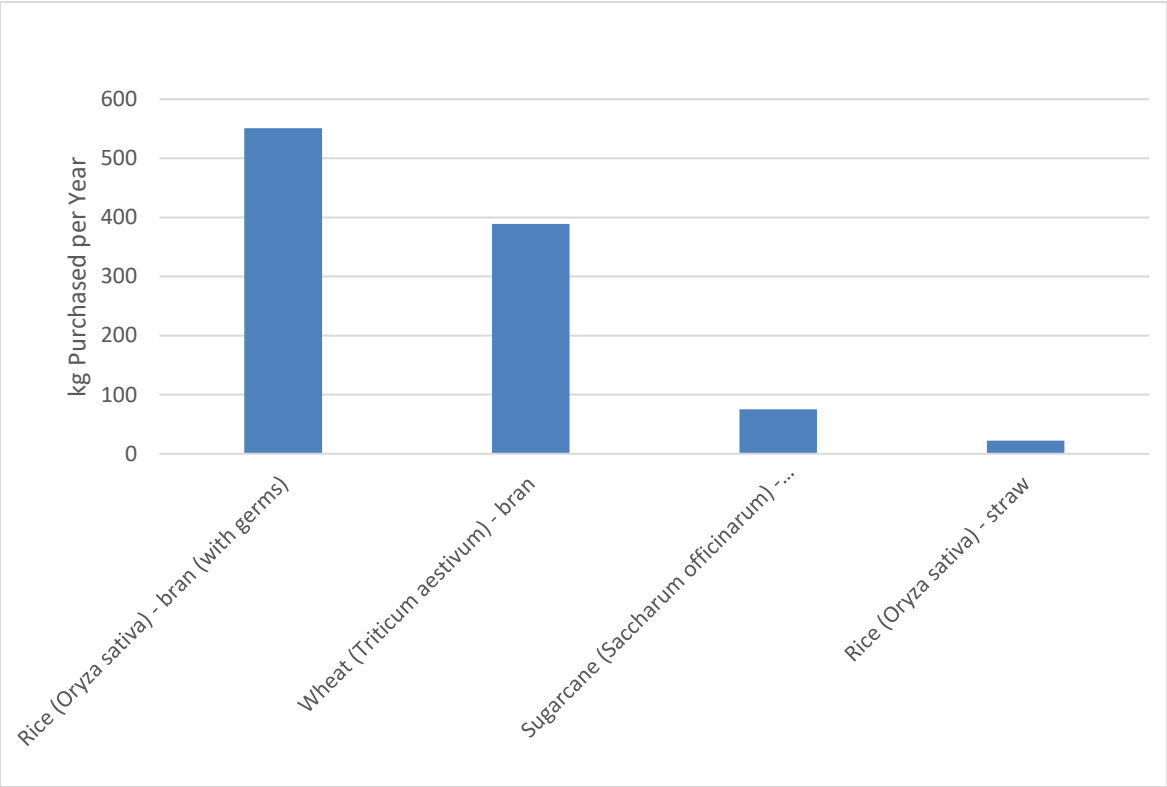

Figure 8: Dominant purchased feed types by kg

Milk and livestock prices

Sale of milk contributes significantly to household income. Milk prices are quite stable all year round and this represents an opportunity to increase milk offtake. Most farmers (80%), use artificial insemination services for breeding.

Key challenges and suggested interventions

Farmers identified some of the major problems they face in livestock production as the high cost of inputs, cattle theft, insufficient livestock feed, unavailability of breeding stock and insufficient veterinary services.

Proposed solutions

1. The high cost of inputs could be addressed by bulk purchasing, farmers forming institutions to market farmer produce and purchase inputs on behalf of farmers in bulk. Farmer groups such as OSIEPE practical action group who are planning to open an agro-vet shop where members can access inputs on credit against their shares.
2. Cattle theft could be addressed by the formation of vigilante groups and community policing.
3. Insufficient livestock feed could be addressed by increasing the area under fodder crop, introducing high yielding fodder crops and fodder conservation.
4. Unavailability of breeding stock could be addressed by engagement in an artificial insemination campaign (A. I) to improve the genetic merit of locally available stock.
5. Insufficient veterinary services could be addressed by farmers lobbying the county government to employ more livestock technical extension staff and training of community-based village extension assistants.
6. Crop residues can be processed for conservation or used as fresh harvest. The crop residues can be processed with molasses and urea, to improve the palatability thus improve the dry matter intake, metabolisable energy and crude protein intake.
7. Other improvements include better disease control measures, the introduction of high yielding fodder and building strong farmer institutions to market farmer produce and farmer lobby groups for advocacy.

References

Department of agriculture livestock and fisheries annual report 2015

Directorate of livestock production annual report 2015

Annexes

1. Context attribute scores

S/No.	Context Attribute	Score (0-4)	Reference
1	Availability of cash	2	Question 1.8 FEAST discussion guide
2	Availability of input delivery	2	Question 1.10 FEAST discussion guide
3	Availability of knowledge	3	Based on facilitator's best judgement
4	Availability of labour	3	Question 1.6 FEAST discussion guide
5	Availability of land for fodder cultivation	2	Question 1.9 FEAST discussion guide
6	Availability of water in the growing season	4	Question 1.5.2 FEAST discussion guide